An Account of an Appendix to the small Intestines of Birds. By James Macartney, *Esq. F.R.S.* Read March 21, 1811. [*Phil. Trans.* 1811, *p.* 257.]

Although almost every author who has written upon the incubation of the egg has observed the direct communication between the yolk-bag and the small intestines of the chick, and although some of them have observed that this duct remains in the form of a small cæcum during life, it appears to have escaped the notice of any one, that in some species of birds this part is of considerable size, and possesses a structure peculiar to itself.

It was in the snipe that Mr. Macartney first observed its magnitude to exceed that of the cæca of the great intestines; and he has since found that in the woodcock and curlew it is proportionally large. In the black coot also, it is long, but slender, like the rest of the intestines in that bird.

In the swan and goose it does not bear the same proportion as in the preceding, though somewhat larger than in the generality of birds.

This cæcum consists always of two tunics, corresponding to the peritoneal and villous coats of the intestinal canal in general, but without any appearance of intervening muscle. Its interior surface is composed of small cells, like the assemblage of mucous follicles, found in various parts of the alimentary canal. The matter contained in this appendix has never been found the same, as in the adjoining intestines, but it has been always filled with a mucous fluid, which it seems to secrete.

This appendix, in most birds, retains evidence of its origin; for the remnant of the yolk-bag is commonly found adhering to its extremity, and still communicates freely with it, especially in the Accipitres, and in the passerine tribe. In the nightingale Mr. Macartney observes, the duct is scarcely visible; but the yolk-bag remains during life as a sac, the size of a large pea, communicating with the intestine.

The preceding facts, says the author, are curious instances of an organ of fœtal life retained in the full-grown bird, for the exercise of a particular function.

An Account of a vegetable Wax from Brazil. By William Thomas Brande, *Esq. F.R.S.* Read May 9, 1811. [*Phil. Trans.* 1811, *p.* 261.]

The substance here examined by Mr. Brande, had been sent to Lord Grenville from Rio de Janeiro, and by him given to Sir Joseph Banks, in the hope that when its properties were investigated, it might be found to answer the purposes of bees' wax, and become a valuable article of commerce between Brazil and this country.

It is said to be the produce of a tree of slow growth, called by the natives Carnauba, and growing in the most northerly part of the

Portuguese settlements; and the same tree also produces a gum as food for man, and another substance employed to fatten poultry.

The substance examined by Mr. Brande resembles that procured from the *Ceroxylon Andicola* described by Humboldt. The Ceroxylon, however, is a tall palm-tree, growing about 1000 toises or more above the level of the sea; but the Brazilian plant is a low tree, and grows in a country where it does not appear that there are any mountains. By analysis also, these products differ entirely; for that of Humboldt, according to Vauquelin's analysis, consists of two thirds resin and one third wax; while that from Brazil is entirely wax, without any perceptible quantity of resin.

Mr. Brande received this wax in the state of a coarse pale-grey powder, soft to the touch, mixed with pieces of bark, and other impurities, amounting to nearly 40 per cent.

It melts at 206° Fahrenheit; and if then purified by straining through linen, it acquires a dirty green colour; when cold it is hard and brittle, and its specific gravity is 980.

In water this wax is wholly insoluble; but by boiling some hours, it communicates a brownish hue to the water, and its peculiar smell.

Alcohol also has no effect on it when cold. Nevertheless, by the assistance of heat, two fluid ounces dissolve ten grains; but eight of these are deposited again as the solution becomes cool, and the remainder may be precipitated by addition of water.

Ether dissolves a small proportion at the temperature of 60°; and when boiled upon it, two fluid ounces dissolve thirty grains, but deposit twenty-six upon cooling.

Fixed oils unite with it very readily by the assistance of heat, and the compounds are in general perfectly soluble in ether, which appears owing to the solubility of these oils, although they are not generally supposed to be soluble.

According to Mr. Brande's experiments, four fluid ounces of ether dissolve $1\frac{1}{4}$ fluid ounce of oil of almonds, $1\frac{1}{2}$ fluid ounce of olive oil, $2\frac{1}{2}$ fluid ounces of linseed oil; and with castor oil it unites in any proportion.

In alcohol, having the specific gravity of 820, castor oil is also perfectly soluble; but the other fixed oils are very sparingly soluble; and even castor oil is scarcely soluble in alcohol that has the specific gravity of 840, unless camphor be added to it. But even this addition will not render other fixed oils soluble in the same menstruum.

When the wax was boiled in a solution of caustic potash, it communicated to the liquor a slight rose colour, but was not dissolved, nor altered in its properties.

The effects of a solution of pure soda were precisely similar, but pure ammonia had scarcely any effect on the wax.

By boiling in nitric acid, the colour of the wax is converted into a deep yellow; and after being washed and cooled, it is found to have become more brittle and harder than before; but neither the fusibility nor the inflammability of the wax are impaired, even by the alternate action of acids and of alkalies upon it.

If the wax be spread thin upon glass and exposed to the action of light, its colour is rendered paler; but the author has not yet succeeded in bleaching it effectually.

Sulphuric acid changes the colour of the wax to a pale brown; and if heat be applied, the decomposition usual with such substances takes place, with extrication of sulphurous acid gas, and decomposition of charcoal.

Though cold acetic acid has very little action on it, yet when boiled upon it for a very long time, it appeared to have rendered it nearly white; but when the wax was afterwards washed with water and fused, it resumed its former colour.

When it is fused in oxymuriatic gas, muriatic acid and water are formed, and charcoal is deposited.

Though Mr. Brande's attempts to bleach this wax have not hitherto completely succeeded, yet since it has been rendered nearly white by the usual method of exposure to light after the action of nitric acid upon it, there seems no reason to suppose that it might not be perfectly bleached by exposure for a sufficient length of time.

With respect to its combustion in the form of candles, the author's trials have been very satisfactory. When the wick is duly proportioned, the combustion is as perfect and uniform as that of any other wax; and when about one sixth or one tenth of tallow is added to it, the brittleness which this wax has in its natural state is removed, without communicating to it any unpleasant odour, or impairing the brilliancy of the flame.

Astronomical Observations relating to the Construction of the Heavens, arranged for the Purpose of a critical Examination, the Result of which appears to throw some new Light upon the Organization of the celestial Bodies. *By* William Herschel, *LL.D. F.R.S.* Read June 20, 1811. [*Phil. Trans.* 1811, *p.* 269.]

Dr. Herschel, having repeatedly re-examined many of the nebulous appearances which he has formerly described, finds that these objects may be arranged in a certain order of regular succession, so as to be viewed in a new light; and in consequence of these views, his opinions respecting the inferences to be drawn from the phenomena have undergone a gradual change, especially with regard to the possibility of resolving many of them into stars, as he had formerly supposed might be done by telescopes of higher power than he had yet employed.

His present arrangement begins with the appearances of diffused nebulosity. Of these he has determined the positions and magnitudes of 52 in number, the aggregate extent of which amounts to 150 square degrees; and since the depth of each may be supposed nearly equal to the length or breadth, the total amount of luminous matter contained in the small proportion of infinite space which we see, exclusive of that which is too dilute to be visible, exceeds all calculation.

Of these nebulous diffusions, the intensity of the light is not